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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,647	01/26/2004	Laura Wills Mirkarimi	10030753-1	1183

22878 7590 07/02/2010

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EXAMINER	
DEO, DUY VU NGUYEN	
ART UNIT	PAPER NUMBER
1713	

NOTIFICATION DATE	DELIVERY MODE
07/02/2010	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LAURA WILLS MIRKARIMI

Appeal 2009-010057
Application 10/765,647
Technology Center 1700

Decided: June 30, 2010

Before MICHAEL P. COLAIANNI, BEVERLY A. FRANKLIN, and KAREN M. HASTINGS, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 the final rejection of claims 1-20. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

Appellant's invention is said to relate to a method of etching III-V semiconductor material using a gas mixture composed of HBr, HI, or IBr, CH_4, and H_2 (Spec. 2). The particular gas mixture is said to provide a fast etch rate, vertical sidewalls in the etched feature, and good control over the

growth of polymers that arise from the presence of CH_4 in the mixture (Spec. 2).

Claim 1 is illustrative:

1. A method for etching a III-V semiconductor material comprising: placing a semiconductor substrate on which said III-V semiconductor material has been deposited into a reactive ion etching reactor;

introducing a first gas chosen from HBr, HI and IBr into said reactive ion etching reactor;

introducing a second gas of CH_4 into said reactive ion etching reactor;

introducing a third gas of H_2; and

exposing a portion of said III-V semiconductor material to be etched to a mixture comprising said first, said second and said third gas.

Appellant appeals the following rejection:

Claims 1-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fathimulla (U.S. Patent 5,338,394, Aug. 16, 1994) in view of Pearton (*Appl. Phys. Lett.* 60(7), 838-40 Feb. 17, 1992).

Since Appellant makes the same argument regarding independent claims 1 and 12, we select claim 1 as representative. 37 C.F.R. § 41.37(c)(1)(vii).

ISSUE

Did the Examiner err in determining that the teachings of the references as a whole would have suggested adding H_2 as taught by Pearton to the CH_4 and HBr gas mixture of Fathimulla to achieve the claimed invention? We decide this issue in the negative.

PRINCIPLE OF LAW

A reference that teaches away cannot serve to create a prima facie case of obviousness. *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). A reference may be said to teach away "when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *Id.* "The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant." *Id.*

To constitute a teaching away a reference must indicate that a particular feature should not or cannot be used for a particular purpose. *Para-Ordnance Mfg. Inc. v. SGS Importers Int'l Inc.*, 73 F.3d 1085, 1090 (Fed. Cir. 1995).

FACTUAL FINDINGS (FF)

We adopt the Examiner's findings in the Answer and Final Office Action as our own. We add the following factual findings:

1. Fathimulla teaches using a mixture of HBr or $SiCl_4$ with CH_4 or H_2 to etch a group III-V semiconductor material such as InP (col. 2, ll. 12-27).
2. Fathimulla is silent regarding combining CH_4 and H_2 gases with HBr.
3. Pearton discloses that using H_2 gas with an HI/Ar mixture provides a smoother etched surface but decreases the etching rate (839).

4. Pearton further discloses that using CH_4 and H_2 as the etching gas provides a slower etch than using HI/Ar and H_2 as the etching gas (838).

Additional findings of fact may be present in the analysis that follows.

ANALYSIS

Appellant argues that Fathimulla and Pearton teach away from combining CH_4, H_2, and HBr (App. Br. 9-12). Appellant argues that Fathimulla's teachings to use either CH_4 or H_2 with HBr would not have directed one of ordinary skill to use CH_4 and H_2 together in the gas mixture and instead would have led in a direction divergent from the path taken by Appellant (App. Br. 10). Appellant further argues that Pearton's teaching that CH_4/H_2 gas mixtures have slow etch rates would have discouraged one of ordinary skill in the art from introducing CH_4 and H_2 into the reactor and thus would not have led an ordinarily skilled artisan to combine CH_4 and H_2 with HBr and arrive at the claimed invention (App. Br. 11). Appellant contends that Examiner used impermissible hindsight in making the combination (App. Br. 13-14).

Appellant's arguments, however, improperly attack the references individually and fail to address the Examiner's stated case. Specifically, the Examiner's stated case is based on the teachings of Fathimulla and Pearton as a whole. Indeed, the Examiner finds that Fathimulla teaches using an etching gas containing CH_4 and HBr, but is silent regarding the use of H_2 with the etching gas mixture (Ans. 3). The Examiner relies on Pearton's teaching that adding H_2 to an etchant gas provides a smooth etched surface (Ans. 3). Based on these teachings the Examiner concludes that it would

have been obvious to add H_2 to Fathimulla's etching gas mixture to produce a smooth vertical feature (Ans. 3). Appellant does not contest the Examiner's reason for combining Pearton's H_2 with Fathimulla's etching gas mixture.

Appellant's teaching away arguments fail to consider the nature of Fathimulla's and Pearton's teachings. Specifically, Fathimulla's teachings to use either CH_4 or H_2 with HBr do not discourage the use of the two gases together. Rather, Fathimulla teachings indicate to one of ordinary skill in the art that it is known that CH_4 or H_2 are known etching gases. Fathimulla's silence concerning the addition of CH_4 and H_2 together does not constitute a teaching away. *Para-Ordnance*, 73 F.3d at 1090.

Moreover, Pearton's teaching that it is known to use CH_4 and H_2 together supports using the two gases together. While Pearton teaches that using a mixture of CH_4 and H_2 has a slower etch rate and such use may deposit polymer on the substrate, Pearton further teaches that the CH_4 and H_2 mixture provide a smooth etch to In-containing III to V semiconductor materials (Pearton 838). The nature of Pearton's teachings do not constitute a teaching away. Rather, one of ordinary skill in the art would understand from Pearton's teachings that CH_4 and H_2 mixture may be used as an etching gas to produce smooth etched features with the attendant slower etch rate and polymer deposition.

Indeed, Pearton teaches that adding H_2 to the etching HI/Ar gas mixture slows down the etching rate and provides for a smoother etched surface (Pearton 839). Accordingly, we find Appellant's teaching away arguments to be without persuasive merit.

Appellant's impermissible hindsight argument fails because Pearton plainly teaches adding H_2 to an etching gas mixture for the purpose of providing a smoother etched surface. In other words, the Examiner's combination is based on the teachings of the art not impermissible hindsight.

For the reasons discussed, we affirm the Examiner's § 103 rejection of claims 1-20 as being unpatentable over Fathimulla in view of Pearton.

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

AFFIRMED

PL Initial:
sld

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